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| Specification Section 32 31 00TYM-HYD BOX FRAME CANTILEVER SLIDE GATE SYSTEM WITH HYDRAULIC OPERATOR (CHAIN LINK) | 1100-Heavy Duty | Tymetal-T-Orange |

1. GENERAL
	1. **SECTION INCLUDES:**

The work in this section shall include furnishing all labor, materials, equipment and appliances necessary to complete all Fortress Box Frame Gate and Hydraulic Operator System(s) required for this project in strict accordance with this specification section and drawings.

* 1. **REFERENCES:**
		1. Underwriters Laboratory Gate Operator Requirements (UL 325).
		2. Operators shall be built to UL325 standards and be listed by a testing laboratory. Complete all electrical work according to local codes and National Electrical code. All fieldwork shall be performed in a neat and professional manner, completed to journeyman standards.
		3. Current safety standards require the use of multiple external sensors to be capable of reversing the gate in either direction upon sensing an obstruction. Also see 2.02 D.
		4. Vehicle gates should never be used by pedestrians. Separate pedestrian gates must always be provided when foot traffic is present.
		5. Current safety standards require gate operators to be designed and labeled for specific usage classes. Hydraulic Operator TYM-HYD-VF2/3 gate operators may be used on Class III and Class IV installations.
		6. ASTM F 2200 – Standard Specification for Automated Vehicular Gate Construction.
		7. ASTM F 1184 – Standard Specification for Industrial and Commercial Horizontal Slide Gates, Type II, Class 2.
		8. American Welding Society AWS D1.2 Structural Welding Code.
	2. **SUBMITTAL:**
		1. Product Data:
			1. Provide manufacturer’s catalog cuts with printed specifications and installation instructions.
			2. Deliver two (2) copies of operation and maintenance data covering the installed products, including name, address and telephone number of the nearest fully equipped service center.
			3. Each operator shall bear a label indicating that the operator mechanism has been tested for full power and pressure of all hydraulic components, full stress tests of all mechanical components and electrical tests of all overload devices.
		2. Shop drawings:
			1. Supply shop drawings showing the relationship of operating systems with gate components, including details of all major components.
			2. Include complete details of gate construction, gate height and post spacing dimensions.
		3. Certification of Performance Criteria:
			1. Manufacturer of gate system shall provide certification stating the gate system includes the following material components that provide superior performance and longevity. Alternate designs built to minimum standards that do not include these additional structural features shall not be accepted.
				1. Gate track system shall be keyed to interlock into gate frame member (providing 200% additional strength when compared to weld only keyless systems). When interlocked with and welded to the "keyed" frame top member, gate track forms a composite structure.
				2. Gate shall have a minimum counterbalance length of 50% opening width which provides a 36% increase in lateral resistance (when compared to ASTM minimum of 40% counterbalance). If gate is ever to be automated, counterbalance section shall be filled with fabric or other specified material.
				3. To provide superior structural integrity, intermediate vertical members shall be used - with spacing between verticals to be less than 50% of the gate frame height.
				4. Entire gate frame (including counterbalance section) shall include 2 adjustable stainless or galvanized steel cables (minimum 3/16”) per bay to allow complete gate frame adjustment (maintaining strongest structural square and level orientation).
				5. Gate truck assemblies shall be tested for continuous duty and shall have precision ground and hardened components. Bearings shall be pre-lubricated and contain shock resistant outer races and captured seals.
				6. Gate truck assemblies shall be supported by a minimum 5/8” plated steel bolt with self aligning capability, rated to support a 2,000 # reaction load.
				7. Hanger brackets shall be hot dipped galvanized steel with a minimum 3/8” thickness that is also gusseted for additional strength.
				8. Gate top track and supporting hangar bracket assemblies shall be certified by a licensed professional engineer to withstand a 2,000 lb. vertical reaction load without exceeding allowable stresses.
				9. Gate is to be designed to meet specified ASCE-7 wind load requirements with the gate in the closed and latched condition only. Typical gate design is expected to operate satisfactorily in winds up to 30 MPH. Depending on gate panel infill, winds higher than 30 MPH may cause gate operational problems (operator entrapment may trigger; gate panel may not engage receiver). For sites with higher operational, non-typical, or specified wind loadings, manufacturer should be advised of the site conditions and a specifically engineered design will be offered.
		4. Certifications
			1. The aluminum welders and welding process for gate manufacture must be certified per section 2.05 C.
			2. Operator Manufacturer: A company specializing in the manufacture of hydraulic gate operators of the type specified, with a minimum of ten years experience.
			3. Manufacturer shall supply gate design performance certification as per section 1.03 C.
1. PRODUCTS:
	1. **HYDRAULIC GATE OPERATORS:**
		1. Hydraulic Gate Operator TYM-HYD-VF2/3 with controller to be supplied by Tymetal Corp., 678 Wilbur Avenue, Greenwich, NY 12834 – (800)-328-4283.
	2. **OPERATION**
		1. Operation shall be by means of a metal rail passing between a pair of reinforced composite wheels with polyurethane treads. Operator motors shall be hydraulic, geroller type, and system shall not include belts, gears, pulleys, roller chains or sprockets to transfer power from operator to gate panel. The operator shall generate a minimum horizontal pull of 300 lb without the drive wheels slipping and without distortion of supporting arms. Operator shall be capable of handling gates weighing up to 5,000. The operator shall be speed controlled by an electronic Variable Frequency Drive (VFD) which will accelerate and decelerate the gate gradually to prevent shock loads to the gate and operator assembly. The maximum gate velocity of the TYM-HYD-VF2/3 operator shall be selectable between 2.2 ft/second and 3 ft/second. The operator shall contain an Emergency Fast Operation (EFO) mode wherein a separate continuous input allows the operator to override all safety inputs and run at the EFO speed. The gate velocity during Emergency Fast Operation (EFO) shall not be less than 3 ft/second. Upon starting, the VFD will gradually accelerate the gate to its maximum speed and when stopping, gradually reduce gate velocity to less than 1 ft/s, whereupon a limit switch will stop the electric motor. Two adjustable hydraulic brake valves (one for each direction) assist in slowing the gate to a precise stop.
		2. Standard mechanical components shall include as a minimum:
			1. Supporting arms: Cast aluminum channel. Arms shall incorporate a fully bushed, 1 1/2" (38 mm) bronze bearing surface, acting on arm pivot pins. (item 2 below)
			2. Arm pivot pins: 3/4" (19 mm) diameter, stainless steel, with integral tabs for ease of removal.
			3. Tension spring: 2 1/2" (63 mm) heavy duty, 800 lb (363 kg) capacity.
			4. Tension adjustment: Finger tightened nut, not requiring the use of tools.
			5. Drive release: Must instantly release tension on both drive wheels, and disengage them from contact with drive rail in a single motion, for manual operation.
			6. Limit switches: Fully adjustable, toggle types, with plug connection to control panel.
			7. Chassis: 1/4" (6 mm) steel base plate and 12 Ga. (3 mm) sides and back welded and ground smooth.
			8. Cover: 10 Ga. zinc plated steel with textured TGIC gray polyester powder coat finish. All joints welded, filled and ground smooth. Finished corners square and true with no visible joints.
2. The cover shall have a detention quality mogul lock.
	* + 1. Finish: Zinc plated steel with textured TGIC polyester powder coat finish, proven to withstand 1,000 hour salt spray test.
			2. Drive wheels: Two 8" diam (203 mm) AdvanceDrive wheels. High-strength composite hub with polyurethane over mold.
			3. Drive rail: Shall be extruded 6061 T6, not less than 1/8" (3.175 mm) thick. Drive rail shall incorporate alignment pins for ease of replacement or splicing. Pins shall enable a perfect butt splice.
			4. Hydraulic hose: Shall be 1/4" (6 mm) synthetic, rated to 3,000 psi (20.6 MPa).
			5. Hydraulic valves: Shall be individually replaceable cartridge type, in an integrated hydraulic manifold.
			6. Hose fittings: At manifold shall be quick-disconnect type, others shall be swivel type.
			7. Hydraulic fluid: High performance type with a viscosity index greater than 375 and temperature range -40° F to 158° F (-40° C to 70° C).
			8. A zero to 2,000 psi (13.7 MPa) pressure gauge, mounted on the manifold for diagnostics, shall be a standard component.
			9. The hydraulic fluid reservoir shall be formed from a single piece of metal, non-welded, and shall be powder painted on the inside and the outside, to prevent fluid contamination.
		1. Minimum standard electrical components:
			1. Pump motor: 2 hp, 3450 RPM, 56C, TEFC, three phase. (Note, the VFD converts single phase input power to drive a three phase motor)
			2. All components shall have overload protection.
			3. Electrical enclosure: Type 1, metal, with hinged lid gasketed for protection from intrusion of foreign objects.
			4. Controls: Smart Touch Controller Board containing:
3. inherent entrapment sensor;
4. built in audible “warn before operate” system;
5. built in timer to close;
6. 32 character OLED display for reporting of functions and codes;
7. multiple programmable user relay output options;
8. anti-tailgate mode;
9. built-in power surge/lightning strike protection;
10. menu configuration, event logging and system diagnostics easily accessible with a PC and HySecurity’s free Smart Touch Analyze and Retrieve Tool;
11. RS-232 port for connection to laptop or other computer peripheral and RS-485 connection for network interface.
12. Dual gate communication connection for bi-parting, sally port, or sequenced gates.
13. Electromechanical and solid state relays.
14. Radio option outputs.
15. 21 inputs for site specific configurations.
	* + 1. Transformer: 75 VA, non-jumpered taps, for all common voltages.
			2. Control circuit: 24 VDC.
			3. Provide a terminal strip for connection of external interlocks.
		1. Required external sensors: See 1.02 A2. Specify photo eyes or gate edges or a combination thereof to be installed such that the gate is capable of reversing in either direction upon sensing an obstruction.
		2. Optional control devices: (consider one or more of the following: card reader, key-switch, radio control, pushbuttons, vehicle detectors, keypads or seven day timers).
		3. 208/230 VAC single phase and 208/230/460 VAC three phase available. 115 is not available. (50 Hertz is available specify voltage.)
	1. **FACTORY TESTING**
		1. Fully assemble and test, at the factory, each gate operator to assure smooth operation, sequencing and electrical connection integrity. Apply physical loads to the operator to simulate field conditions. Tests shall simulate physical and electrical loads equal to the fully rated capacity of the operator components.
		2. Check all mechanical connections for tightness and alignment. Check all welds for completeness and continuity. Check welded corners and edges to assure they are square and straight.
		3. Inspect painted finish for completeness. Touch up imperfections prior to shipment.
		4. Check all hydraulic hoses and electrical wires to assure that chafing cannot occur during shipping or operation.
	2. **BOX FRAME Cantilever slide gate MANUFACTURERS:**
		1. The Box Frame Cantilever Sliding Gate shall be manufactured by Tymetal Corp., 678 Wilbur Avenue, Greenwich, NY 12834 ‑ (800) 328 ‑ 4283.
		2. Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 welding code. Upon request, Individual Certificates of Welder Qualification documenting successful completion of the requirements of the AWS D1.2 code shall also be provided.
	3. **BOX FRAME CANTILEVER SLIDE GATE:**
		1. Fortress Box Frame Cantilever Slide Gate System dimensions shall be as shown on the detail drawings.
		2. Gate Frame:

### The gate frames shall be fabricated from 6063-T6 aluminum alloy extrusions. If fabricated as a single horizontal piece, no splices will be required. When the gate frame is manufactured in two horizontal pieces or sections, they shall be spliced in the field (the gate frame shall be fabricated in one or multiple sections depending on size requirements or project constraints).

* + - * 1. The primary members (top and bottom) shall be "P" shaped in cross section with no less than 2" on a side and weighing not less than 1.6 lb/lf. To maintain structural integrity this top member shall be "keyed" to interlock with a "keyed" track member.

### End vertical members of the gate frame are 2”x2”, weighing not less than 1.1 lb/lf. Interior vertical members shall alternate between 1"x1" and 1"x2" in cross section, weighing not less than .52 lb/lf and .82 lb/lf respectively. The 1”x2” and 1”x1” intermediate vertical members shall be spaced at a distance not to exceed the overall height of the box frame. The gate shall be constructed in "box" form with the width between the frames measuring 24" from outside to outside. Between these frames there shall be a continuous series of 1"x1" diagonal and horizontal bracing with the diagonals welded at approximately 45 degrees to the frames.

* + 1. Fabrication:

### All welds on the gate frame shall conform to Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code. All individual welders shall be certified to AWS D1.2 welding code. See 1.02 D.

* + 1. Gate Track:
			1. The semi-enclosed "keyed" track, extruded from 6005A-T61 or 6105-T5 aluminum alloy, shall weigh a minimum of 2.9 lb/lf. A track member is to be located on each side frame. When interlocked with and welded to the "keyed" primary member, it forms a composite structure with the top of the gate frame. Welds to be placed alternately along the top and side of the track at 9" centers with welds being a minimum of 2" long.
		2. Gate Mounting:
			1. The gate frame is to be supported from the track by four (4) swivel type, self-aligning, 4‑wheeled, sealed lubricant, ball-bearing truck assemblies.
			2. The bottom of each support post shall have a bracket equipped with a pair of 3” (76mm) UHMW guide wheels Wheel cover protectors shall be included with bottom guides to comply with UL325.
			3. Gap protectors shall be provided and installed, compliant with ASTM F 2200.
		3. Diagonal Bracing:
			1. Diagonal "X" bracing of 3/16" or 1/4” diameter stainless or galvanized steel cable shall be installed throughout the entire gate frame.
		4. Posts:

### Double sets of support posts shall be minimum 4" O.D. (102mm) round SS40 or 4” x 4” x 3/16” wall square steel tubing, grade 500. Gate posts shall be galvanized or coated and supported in concrete footings as specified by the design team.

* + 1. Gate Filler:

### Chain Link: 2” x 2” x 9 gauge aluminized steel chain link fabric shall extend the entire length of the gate (if operated gate, counterbalance must also have fabric to prevent reach through and comply with ASTM F 2200, see 1.03 C.1) Fabric shall be attached at each end of the gate frame by standard fence industry tension bars and tied at each 2” x 2” (51mm x 51mm) vertical member with standard fence industry ties. ASTM F2200 requires attachment method that leaves no leading or bottom edge protrusions (cannot exceed 0.5 inch).

* + 1. Gate Finish:
			1. Gate to be mill finish aluminum or color coated with polyester powder as specified. If powder coated, the gate (including track member) and all accessories shall be pretreated chemically by sand blasting or other acceptable method to ensure proper coating adherence. Gate posts (to be supplied by others) shall be galvanized or coated as specified by the design team.
	1. **WARRANTY:**
		1. The cantilever slide gate and operator system shall be warranted by the manufacturer against manufacturing defects for a period of (3) three years from date of sale. The truck assembly shall be warranted against manufacturing defects by the manufacturer for a period of (5) five years from date of sale.
1. EXECUTION
	1. **Site INSPECTION:**
		1. Final grades and installation conditions shall be examined. Installation shall not begin until all unsatisfactory conditions are corrected.
		2. Locate concrete mounting pad in accordance with approved shop drawings.
		3. Make sure that gate is level and operating smoothly under manual conditions before installation of gate operators. Do not proceed until gate panel is aligned and operates without binding.
	2. **INSTALLATION:**
		1. Equipment in this section shall be installed in strict accordance with the company’s printed instructions, current at the time of installation (unless otherwise shown on the contract drawings).
		2. Coordinate locations of operators with contract drawings, other trades and shop drawings.
		3. Installer shall insure that the electric service to the operator is at least 20 AMPS. Operator wattage is 2400.
		4. The gate and installation shall conform to:
			1. ASTM F 1184 standards for aluminum cantilever slide gates, Type II, Class 2.
			2. ASTM F 2200 standard specification for automated vehicular gate construction.
			3. UL325 standards.
		5. The installing contractor shall be responsible to ensure that appropriate external primary entrapment safety devices be installed for the specific site conditions to protect against all potential entrapment zones. Proper operation of these safety devices shall be verified and training as to the operation and maintenance of these devices for the users and owners shall be documented.
	3. **SYSTEM validation:**
		1. The complete system shall be adjusted to assure it is performing properly. Test gate operator through a minimum of ten full cycles and adjust to ensure operation without binding, scraping or uneven motion. Test limit switches for proper "at rest" gate position.
		2. Gate lock shall be aligned properly to lock and unlock without binding. Test gate lock through a minimum of ten full cycles and verify secure locking.
		3. All anchor bolts shall be fully concealed in the finished installation.
		4. Test and Explain Safety Features:
			1. Each system feature and device is a separate component of the gate system.
			2. Read and follow all instructions for each component.
			3. Ensure that all instructions for mechanical components, safety devices and the gate operator are available for everyone who will be using the gate system.
			4. The warning signs shipped with the gate operator must be installed in prominent position on both sides of the gate.
		5. Ensure the owner is clear with regard to the safety points concerning the basic operational guidelines of the safety features of the gate operator system. These safety points are listed in the operator manual and must be read prior to system use.

**Note: Tymetal Corp. reserves the right to modify and/or make changes as deemed necessary without previous notice.**